DOCUMENT RESUME

ED 042 491 PS 003 322

AUTHOR	Favell, Judith Elbert; And Others
TITLE	An Experimental Analysis of Error Interaction on "Errorless" and Trial-and-Error Programs. Progress Report.
INSTITUTION	Kansas Univ., Lawrence. Head Start Evaluation and Research Center.
SPONS AGENCY	Office of Economic Opportunity, Washington, D.C.
REPORT NO	KU-HSERC-TR-5
PUB DATE	Aug 68
NOTE	7p.
EDRS PRICE	EDRS Price MF-$0.25 HC-$0.45
DESCRIPTORS	*Cues, Culturally Disadvantaged, *Discrimination Learning, *Learning Processes, Preschool Children, Rewards, Task Performance
IDENTIFIERS	Errorless Learning, Project Head Start

ABSTRACT

In this study of errorless learning a procedure is tested which allows the subject himself to adjust the speed at which a supplementary stimulus aid is withdrawn. A standard match-to-sample apparatus with 1 sample window above and 4 matching (response) windows below was used. Tokens were delivered for correct responses and the correct matching windo could receive extra illumination to provide the supplementary stimulus aid. Four children between the ages of five and eight from a lower income neighborhood served as subjects. The research involved 3 phases: (1) a preliminary measurement of task performance without the extra-dimensional cue, (2) a set of trials in which the subject could produce the supplementary aid, and (3) a set of trials in which the subject could produce the extra cue, but only at the cost of a subsequent loss of tokens. It was hoped that in this final phase a self-programmed fading out would occur. However, the subjects never phased out the supplementary stimulus aid, possibly because of the time lag between task aid and token loss. (MH)

ED042491

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

TECHNICAL REPORT

RESEARCH

Report No. 05

PS 003322

UNIVERSITY OF KANSAS

HEAD START EVALUATION AND RESEARCH CENTER

University of Kansas, Lawrence, Kansas

The research reported herein was performed, inpart, pursuant to a contract with the Office of Economic Opportunity, Executive Office of the President, Washington, D. C. 20506. The opinions expressed herein are those of the author(s) and should not be construed as representing the opinions or policy of any agency of the United States Government.

AN EXPERIMENTAL ANALYSIS OF ERROR INTERACTION ON "ERRORLESS" AND TRIAL-AND-ERROR PROGRAMS

Judith Elbert Favell
James E. Favell
Barbara C. Etzel

INTRODUCTION

A fading procedure involves the gradual decrement of stimulus aid in the teaching of a concept. Initially, an "extra" stimulus dimension is used to help signal the correct answer, and slowly this stimulus is withdrawn until, theoretically, the subject is responding appropriately without it. Fading, it has been shown, can result in learning a task while emitting few, if any errors. The advantages of such errorless learning seem numerous, although unproven. However, programing a fading sequence which proves effective in producing an errorless performance has shown to be extremely costly in experimenter time. The problem of fading at the speed uniquely appropriate for each subject requires countless revisions.

An obvious solution suggests itself: Allow the subject to adjust the speed at which the supplemental stimulus aid is withdrawn.

This study reports the initial development of a procedure to experimentally examine self-help behavior, and to suggest practical extensions.

Apparatus

A standard match-to-sample apparatus was used. Figure 1 shows the stimulus and response panel consisting of a "sample" window positioned above four "match" windows. Pressure applied to each window was automatically recorded as a response.

On each trial a sample and four possible matches were simultaneously projected from behind by a Bell and Howell projector. Only one match was correct for each trial, and the position of the correct stimulus was "randomized" from trial to trial. A light below the correct match was illuminated at an intensity directly proportional to the rate of subject presses to the sample window. The intensity of this light in the absence of any response to the sample window was adjusted to below the subject's threshold (as judged by the experimenter).

Programing and recording were accomplished through standard electromechanical equipment.

Fixed above the stimuli and response panel was an aperture leading from a Gerbrands Universal Feeder. Reinforcers were delivered through the aperture into a clear plastic container mounted below.

Materials

The task consisted of matching a geometric form with an identical, but rotated form. The distractors, or incorrect stimuli, consisted of mirror images of the same geometric form which were also rotated. On each photographic slide a sample, a correct match, and three distractors were displayed. Figure 2 shows eight geometric forms used as sample stimuli.

Subjects

Four children were selected from a lower income neighborhood in Lawrence. Selection was contingent on the Mother's permission to allow her child to attend daily sessions. Children between the ages of five and eight were specifically requested.

Procedure

The general strategy of this research involved the following three phases: 1) a preliminary measurement of accuracy of matching-to-sample when the S was not proveded with supplemental stimulus aids. That is, S's were required to discriminate on the basis of the properties of the match-to-sample stimuli without receiving extra help. A token was delivered for each correct response. 2) providing the S with the opportunity of responding to produce additional stimulus aid by illuminating a light which signaled the correct match. 3) introducing a cost contingency for responding to produce this extra help in the selection of the correct answer. Thus, the subject paid tokens to receive illumination of the cue light.

This strategy was designed to investigate the effect of a cost contingency on a subject's use of a cue which signaled the correct answer. It represents an initial attempt to develop procedures which allow the S to "fade" himself from the use of this extra cue at a speed which will not disrupt accuracy to the matching task, while insuring that he must diminish the use of those cues to receive reinforcement for matching. From preliminary work with three and four year old children, such a specific procedure was generated.*

---

*These children were selected from the Edna A. Hill Child Development Preschool Laboratory.

Phase I The subjects were brought to the experimental room and the following instructions were given:

> "Sit down. Pick the one of these (pointing to each match window in sequence) which matches this (pointing to sample). (The subject points to one). If you want to choose this one, press on the window like this (demonstration). If you are right, a token will drop into this box. You get a penny for each token you earn. If you are wrong, no token will drop into the box. Now, keep going until I tell you to stop."

A session consisted of 140 trials. On each trial a sample and four matches appeared; the S selected one match by depressing its corresponding window. If the response was correct, a token was delivered. An incorrect response produced a four second interval during which all windows were dark and after which the next slide appeared. At the end of the session, the tokens were counted and each was redeemed for a penny.

Pre-experimental sessions were continued until it was determined that the subjects were truly responding randomly and not learning the matching task.

Phase II The first experimental session was initiated by the following instructions:

> "When you are right, what happens? Yes, you earn a token. What do you trade tokens for? Yes, pennies. Now I will show you how to be right more often and earn more tokens. When you press on this (sample) window for awhile, one of these lights comes on. Watch (demonstration). Which light is on? Right. That means that this window is correct. Press it and see. Now you try. (1. Press on sample window. 2. Look at light. 3. Press window above light)."

Thus the procedure was identical to the previous phase with the addition of the opportunity to produce supplemental stimulus aid. Approximately ten presses of the sample window were required to illuminate the light to a super-threshold value, and twenty-five were necessary to increase it to full intensity.

Three of four sessions using the above procedure were conducted. Phase II continued until the S was responding consistently to produce the stimulus aid of the extra light.

Phase III The S was brought to the experimental room and the following instructions were given:

> "Every time you use the light to help you find the right answer, it will cost you 1/2 penny. At the end of the session I will subtract the money you have spent for using the lights."

Thus the procedure remained identical to that of the previous phase with the exception that producing extra stimulus cues cost the subject tokens.

Regardless of how many presses (above zero) the subject emitted to the sample window on a given trial, 1/2 a token was subtracted from his total. At the end of the session, the Experimenter counted all the tokens earned and subtracted 1/2 token for each trial in which the subject produced the aid light.

RESULTS AND DISCUSSION

Two reliable effects were seen. In Phase II, subjects quickly learned to operate the sample window to produce extra stimulus assistance and thereafter did so on every trial. During Phase III (the cost contingency) subjects continued using the supplemental stimulus on every trial, even though it reduced daily earnings to half the previous amount.

Two possible explanations of this latter effect suggest themselves. First, it may be that the loss of 1/2 token on each trial was not sufficiently aversive to decrease responding on the sample window. A second possibility is that the relationship between responding to produce additional help (light illumination) and the cost to receive this aid may have been obscured by the lengthy temporal interval between the two. Operating the sample window insured the delivery of a token on each trial, and it was not until the session had terminated that the Experimenter subtracted tokens for using this aid. It seems that a more immediate contingency would be appropriate, i.e., a certain amount subtracted immediately after each trial if the extra stimulus had been produced.

Instead of the awkward exchange of tokens necessitated by this arrangement, a more convenient tactic seems to be the addition of points on a counter as reinforcers, and the subtraction of points as a consequence of producing extra help. Points may prove to be too abstract for children who are not proficient at counting or identifying numbers. In fact, preliminary findings suggest this is the case. Therefore, an effective exchange system for use with this age child must be explored.

The extensive procedural modifications necessary to resolve some of the problems inherent in this design has dictated postponing the continuation of this project. However, the match-to-sample apparatus has shown promise in investigations of problems pertinent to the Head Start age child. It was therefore decided to design studies, using this equipment, which might answer more fundamental questions regarding match-to-sample procedures before returning to more complicated issues, such as the question originally proposed.

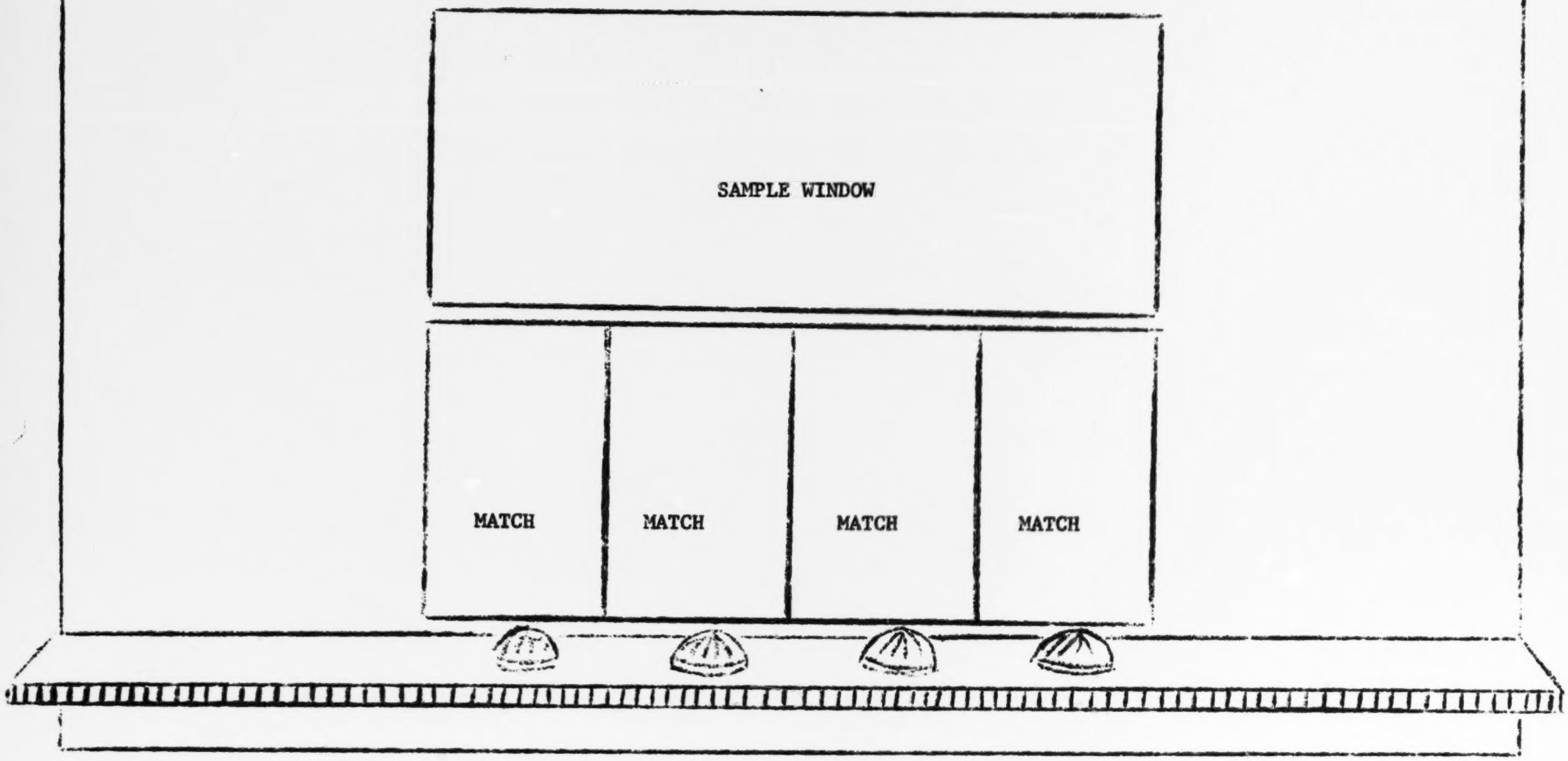

Figure 1. Stimulus and Response Panel.

PS 003322

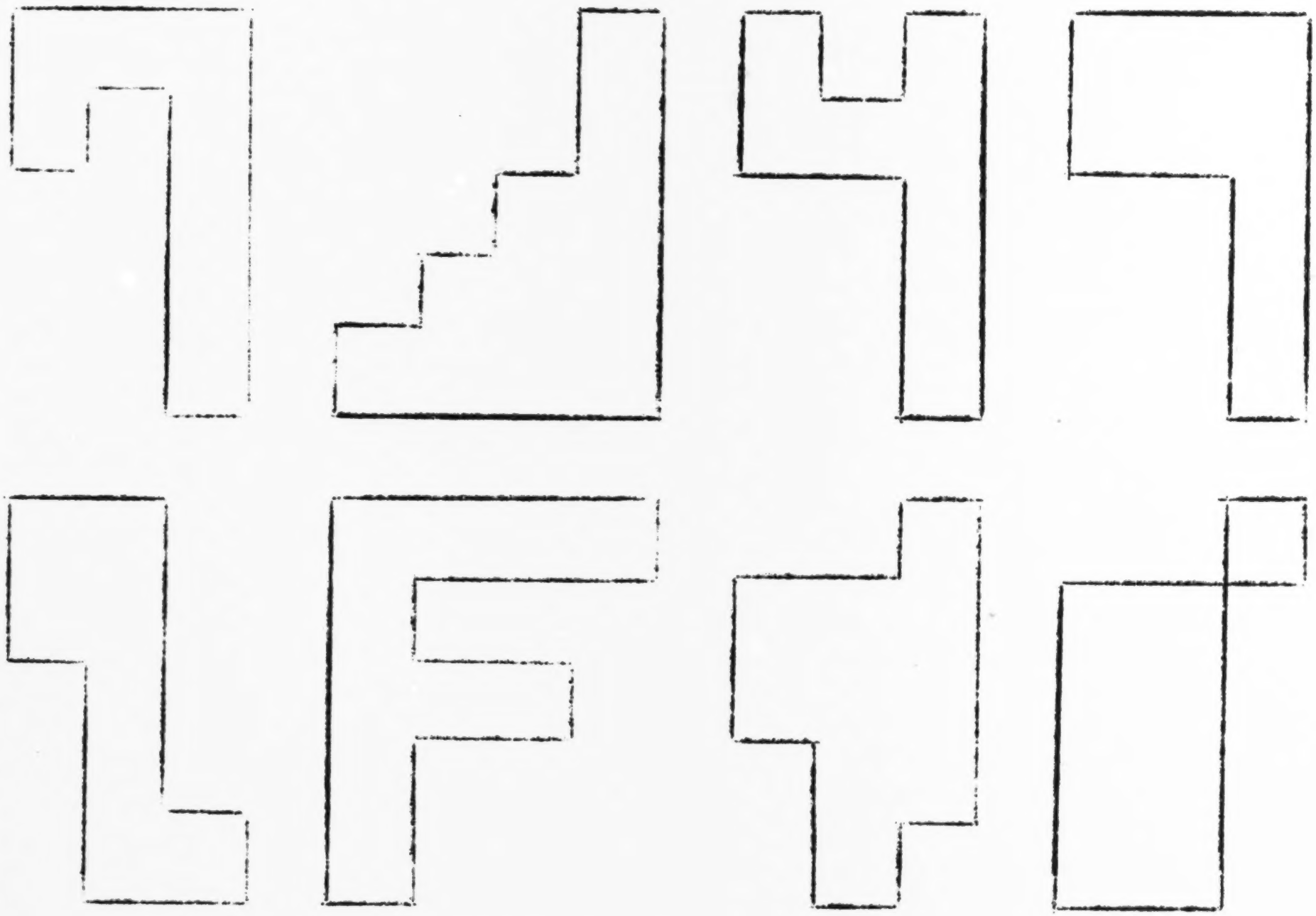

Figure 2. Geometric Forms Used as Sample Stimuli.